

## EXHIBIT 7



(12) **United States Patent**  
**Burnett**

(10) **Patent No.:** **US 8,503,691 B2**  
(45) **Date of Patent:** **\*Aug. 6, 2013**

(54) **VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)**

(75) Inventor: **Gregory C. Burnett**, Dodge Center, MN (US)

(73) Assignee: **AliphCom**, San Francisco, CA (US)

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1050 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **12/139,333**

(22) Filed: **Jun. 13, 2008**

(65) **Prior Publication Data**

US 2009/0003623 A1 Jan. 1, 2009

**Related U.S. Application Data**

(60) Provisional application No. 60/934,551, filed on Jun. 13, 2007, provisional application No. 60/953,444, filed on Aug. 1, 2007, provisional application No. 60/954,712, filed on Aug. 8, 2007, provisional application No. 61/045,377, filed on Apr. 16, 2008.

(51) **Int. Cl.**  
**H04R 3/00** (2006.01)

(52) **U.S. Cl.**  
USPC ..... **381/92**; 381/94.7; 704/233; 704/E21.004

(58) **Field of Classification Search**  
USPC ..... 381/92, 94.7; 704/233, E21.004  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,473,701 A \* 12/1995 Cezanne et al. .... 381/92  
7,386,135 B2 \* 6/2008 Fan ..... 381/92

\* cited by examiner

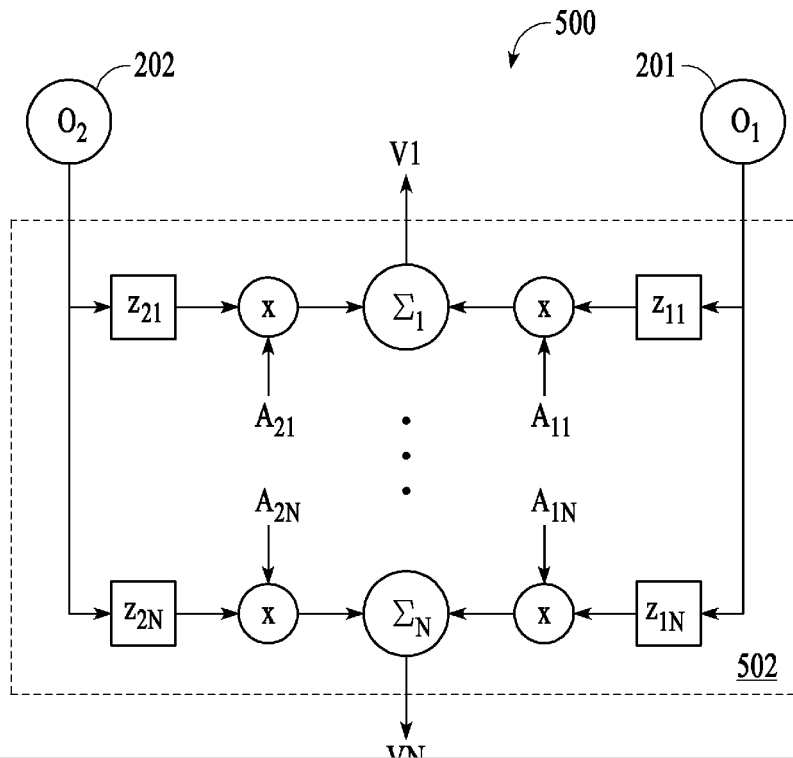
*Primary Examiner* — Howard Weiss

(74) *Attorney, Agent, or Firm* — Kokka & Backus, PC

(57) **ABSTRACT**

A dual omnidirectional microphone array noise suppression is described. Compared to conventional arrays and algorithms, which seek to reduce noise by nulling out noise sources, the array of an embodiment is used to form two distinct virtual directional microphones which are configured to have very similar noise responses and very dissimilar speech responses. The only null formed is one used to remove the speech of the user from  $V_2$ . The two virtual microphones may be paired with an adaptive filter algorithm and VAD algorithm to significantly reduce the noise without distorting the speech, significantly improving the SNR of the desired speech over conventional noise suppression systems.

**46 Claims, 17 Drawing Sheets**



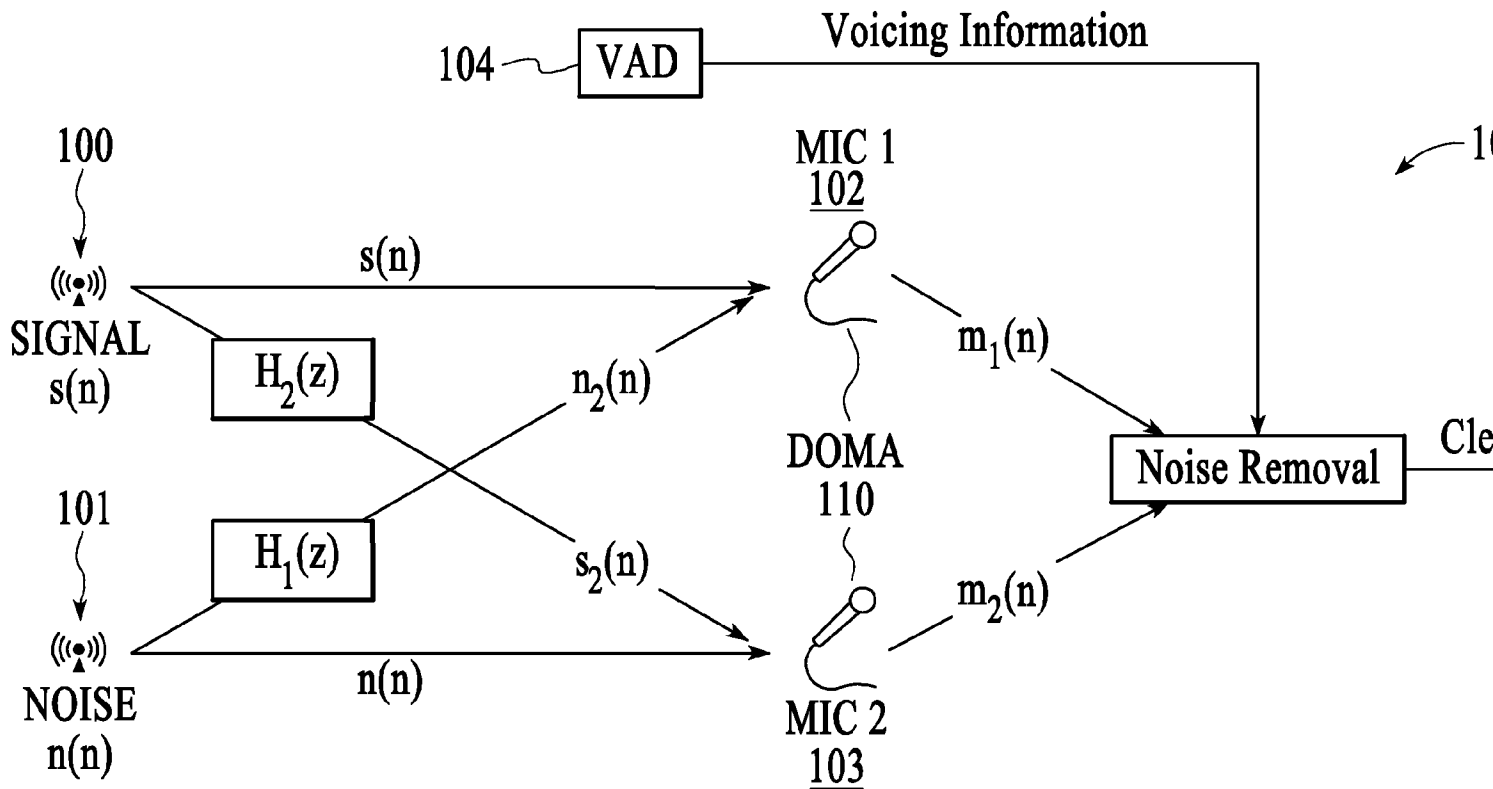


FIG.1

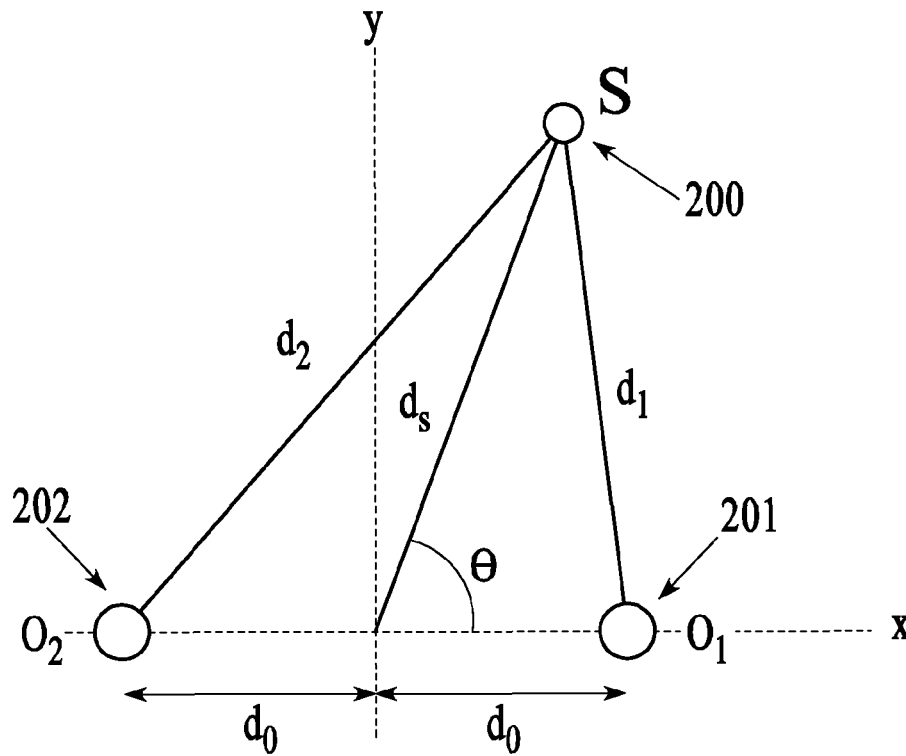


FIG.2

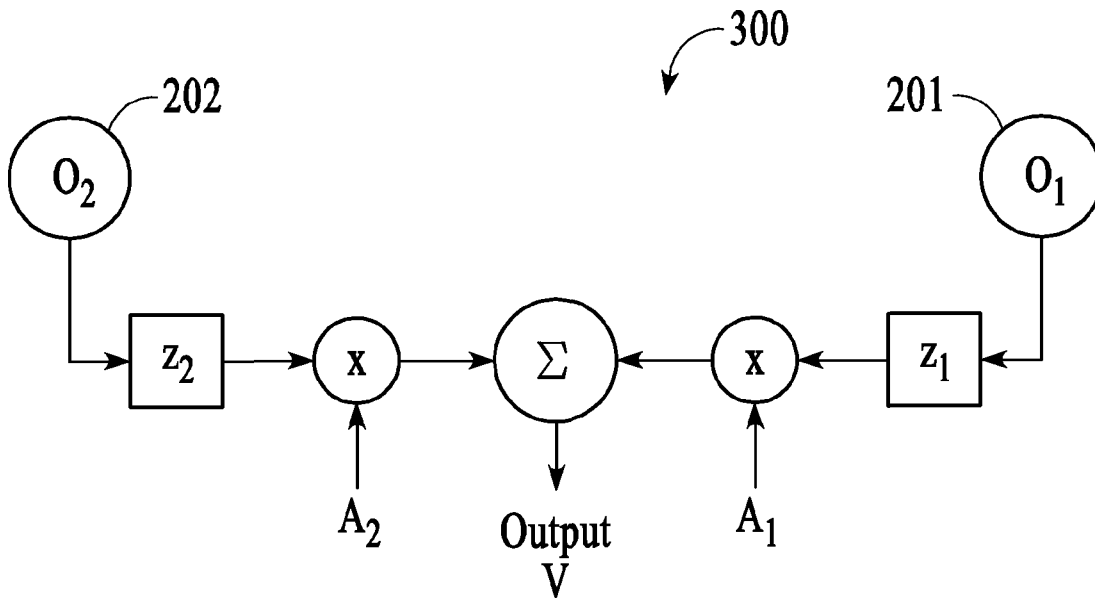


FIG.3

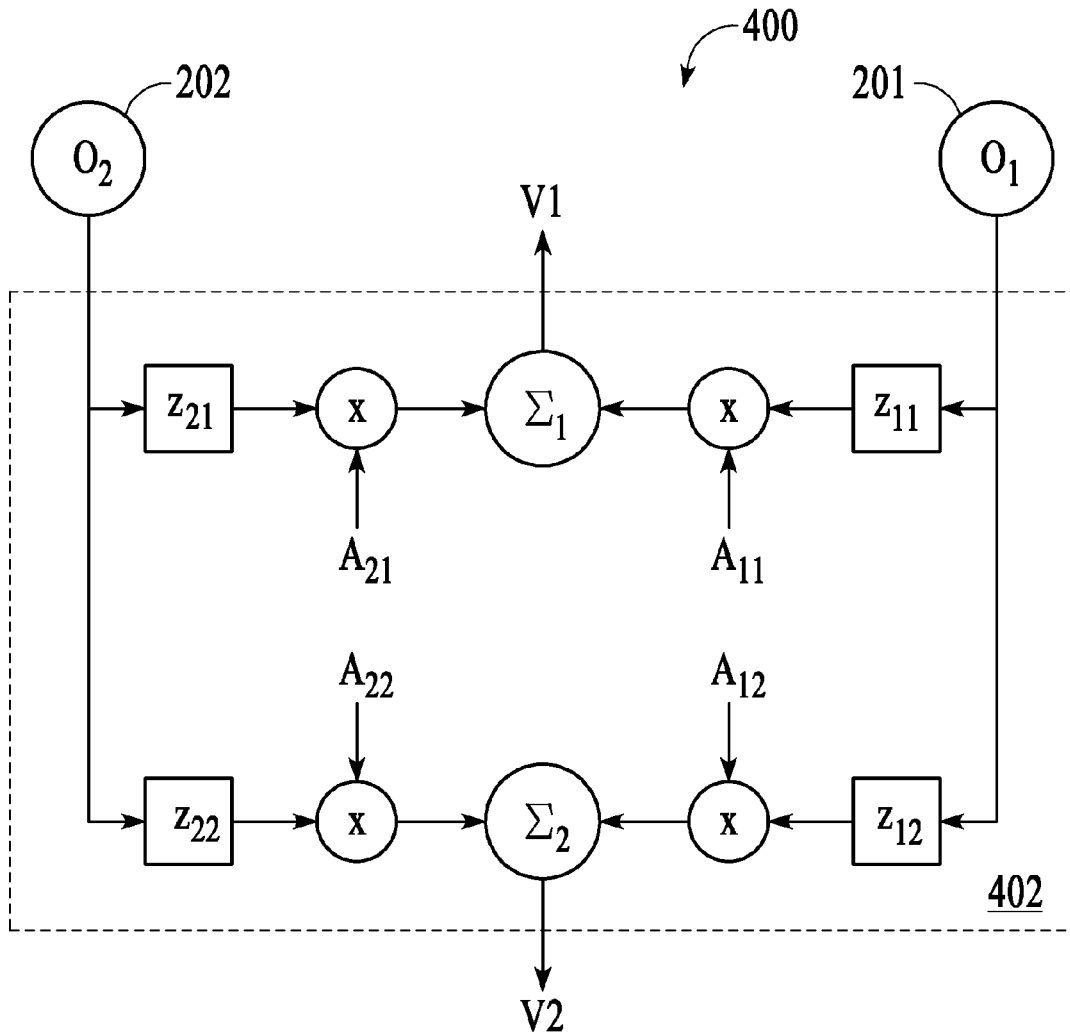


FIG.4

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.